

Further Observations on the Mountain Pigmy Possum (*Burramys parvus*)

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SUMMARY

Observations are given on the occurrence of *Burramys parvus* in the Kosciusko National Park, New South Wales. The animal is found in patches of shrubs and snow gum associated with boulders in the sub-alpine to alpine zone. The habitat is under several feet of snow in winter but the temperature at ground level does not go below freezing.

In captivity *Burramys* eats a variety of fruits, seeds and insects. Vitamin and calcium supplements appear to be necessary to prevent the development of a condition resembling rickets. Feeding behaviour is described. The large specialized premolars are used to cut up insects with hard cuticles, for opening hard-shelled seeds, and breaking up hard food. Seeds are stored in the nests.

Young are born in November-December and are independent by March. The normal litter is four. One captive experienced periods of torpor in winter but hibernation does not appear to be universal in *Burramys* as it is in pigmy possums of the genus *Cercartetus*.

INTRODUCTION

Since the first living mountain pigmy possum (*Burramys parvus*) was collected at Mt. Hotham, Victoria, in 1966, several more specimens have been taken, and the known range of the animal extended in the high country of Victoria and New South Wales. Dixon (1971) trapped a specimen in the Falls Creek area, Bogong High Plains, Victoria, in February 1971, and mentions another three caught at Mt. Hotham in the same month by the Department of

Fisheries and Wildlife. Calaby, Dimpel and Cowan (1971) recorded the capture of three specimens in the Kosciusko National Park, New South Wales, in February and March, 1970. Since that paper was submitted for publication we have accumulated a considerable amount of new information on the species, which we feel will be of interest to naturalists and conservationists.

Range and habitat in the Kosciusko National Park

In the Kosciusko National Park we have live-trapped a total of 19 adult or sub-adult *Burramys* (11 males and 8 females) during October to March at four sites, two of which were reported by Calaby *et al.* (1971). The two new ones are: a small unnamed creek running into the Geehi River approximately 2.5 air miles north-northwest of Schlinck Pass at an altitude of about 4500 ft., and a small un-named tributary of Whites River about 0.6 mile downstream from the Whites River Hut at an altitude of approximately 5,500 ft. The former of these localities is the lowest altitude at which *Burramys* has been found. The distance between the two most remote of the four sites is about eight miles.

The habitat in all cases is characterized by a tree cover of snow gum (*Eucalyptus niphophila*), a dense or fairly dense shrub stratum two to four feet high, and large boulders protruding from the soil. The colony at the lowest altitude was at the upper

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edge of the alpine ash (*E. delegatensis*) zone and tall trees of this species were present in addition to snow gum. The results of much trapping in a variety of areas and habitats at a number of altitudes support our previous conclusion that *Burrhamys* is apparently restricted to patches of shrubs associated with snow gum and boulders in the subalpine to alpine zone. The habitat of the Falls Creek locality described by Dixon (1971) has essentially the same features as the three higher sites in the Kosciusko National Park. In spite of the recent discovery of *Burrhamys* as a living animal it is probably not rare in its restricted geographical range. Its density is low but suitable habitat is common and we feel that it would be found in most likely-looking places if they were trapped sufficiently.

The most accessible locality at about 5,000 ft. altitude was visited a number of times during the winters of 1970 and 1971. In the depth of winter the snow had a minimum thickness of three feet and, except for the very large boulders, all shrubs and rocks were covered. There were small holes in the snow adjacent to the protruding boulders, and tracks of small animals were seen around the holes and on the surface of the snow.

With two thermometers, temperatures were taken simultaneously in the air and in runways beneath the snow at a range of altitudes and in a variety of weather conditions. With snow cover more than 1 ft. 6 in. in thickness temperature at ground level never fell below 0°C. When the snow cover was less than one foot deep the temperature at ground level approached air temperature. The lowest ground temperature recorded was -4.5°C under snow one foot in depth, when the air temperature was -11°C. It is concluded that the small ground mammals including *Burrhamys* would

have no problems in withstanding winter weather conditions beneath deep snow at high altitudes.

Burrhamys in captivity

Of the nineteen animals trapped, seven together with the young of one of them have been kept in captivity, and twelve were released at the points of capture. Three of these were caged for short periods before release. Cages are of wood with glass fronts, and the floor areas are either 6 or 8 sq. ft. They have externally-fitted detachable nest-boxes, and the floors consist of removable sand trays. The cages were originally equipped with sloping tree branches but later small rock piles were added.

The three original animals reported by Calaby *et al.* (1971) survived in captivity for different lengths of time. The single male died after 18 weeks, and there was no apparent cause of death. The two females lived for 31 weeks 5 days, and 36 weeks 6 days respectively. In both, the limb bones were soft and flexible at death, and in the last few weeks of its life one of them lost considerable weight in spite of eating normal amounts of food. It became paralysed in the hindquarters, particularly the legs, and dragged itself around by the front legs. The symptoms were similar to rickets in small domestic mammals. The proprietary vitamin supplement "Penta-vite" was given to them some weeks before death but did not arrest their condition. With subsequent animals, Penta-vite and calcium hydroxide have been given regularly in honey. With these dietary supplements animals have remained healthy and three of them taken into captivity on 27 November 1970 as very small young in their mother's pouch are alive and healthy at this date (December 1971).

In general wild-caught *Burrhamys*

are very shy and usually come out of the nest boxes only at dusk or in darkness when it is quiet. When they first appear they usually go to the food containers, pick up something quickly and run back to the nest box. If the cage contains a rock pile they carry the food behind or on to the rocks and eat it there. When handled frequently they may become docile. *Burrhamys* kept in very small cages quieten down quickly; in such circumstances they indulge in behaviour common among small mammals in inadequately small cages, such as endlessly turning back somersaults. Young ones raised in captivity are much tamer, often come out in daylight, and are not unduly disturbed by strange noises. There is considerable variation in temperament however, some animals are quiet and tame when first trapped while others are shy and nervous and bite savagely when handled. Two or more *Burrhamys* can be kept in the same cage and strange animals of the same or opposite sexes will share a nest box immediately without strife.

During the daytime the animals sleep in their nests with their heads bowed against the chest or abdomen, ears furled, and the tail curled up like a watch-spring against the body. At night when not feeding they spend most time on the rocks and it seems clear that they prefer to live among and hide in the rocks. They can climb and run upside down on the lower sides of small diameter sloping branches. The branch is gripped by both forefeet together alternating with both hindfeet together. A considerable amount of time is spent in grooming especially when they first emerge. Much of the body is scratched vigorously with the syndactylous claws and the forepaws. The fur is licked, and the face and back of the ears are rubbed with the forepaws after these have been licked.

Except on one occasion when a flea was observed, no parasites were found on newly-caught animals, but considerable numbers of the flea *Acanthopsylla rothschildi rothschildi* have been bred from nesting material taken from the nest boxes. This flea is a well-known parasite of the marsupial-mice (*Antechinus* spp.) and murid rodents.

Food and feeding behaviour

As reported previously (Calaby *et al.*, 1971) the faeces of our first three specimens, taken from the traps before the animals had fed, consisted largely of plant material, with some insect remains. With subsequent animals the faeces have contained mostly invertebrate remains, including worms, beetles, grasshoppers, and spiders. In captivity *Burrhamys* have been fed a variety of fruits and seeds such as sliced apple and pear, grapes, soaked raisins, walnut chips, raw peanuts, sunflower seeds, honey, and insects, such as mealworm larvae and moths. All of these are readily eaten. The tail never becomes incrassated as it does in *Cercartetus* species, even when the *Burrhamys* become very fat in captivity. *Burrhamys* takes a considerable quantity of water, lapping it up with the tongue.

Feeding trials in the first couple of weeks of captivity indicated that a greater amount of fruit and seeds was eaten than insect material. After this period such trials are of limited use. For example, individuals of *Cercartetus nanus* would eat only insects and honey when first brought into captivity and starved when only nuts or fruits were offered, but after a few weeks they readily ate raw peanuts if no insects were offered. It is probable that in the wild, *Burrhamys* feed on whatever palatable fruits, seeds, or invertebrates are available.

The feeding behaviour of *Burrhamys*

is of especial interest because of its possession of large grooved and serrated sectorial premolars. Teeth of this type together with associated dental adaptations occur in a variety of mammals of widely divergent relationships, most of which have been long extinct. There is no clear idea of the use of the teeth (Simpson 1933).

Food is picked up with the incisors then transferred to and manipulated with the forepaws while the animal squats on its hindquarters. The food may be held in one or both forepaws. The soft flesh of fruits is bitten off with the incisors and chewed with the molars. The skins are not eaten and *Burramys* have been observed holding pieces of apple and grape and removing the last fragment of flesh by pulling the skin with their forepaws against the lower incisors. Soft bodied insects such as moths are usually dealt with by the incisors. With insects having a hard cuticle such as mealworm larvae the animal may begin biting with the incisors but usually the insect is held in the forepaws at the side of the mouth and chopped up with the sectorial premolars. Hard-shelled seeds such as sunflowers are invariably held at the side of the mouth and bitten with the premolars. Usually the seed case is opened with a single bite. Peanuts are mostly nibbled with the incisors but the premolars are used also to break up fragments.

Calaby *et al.* (1971) and Dixon (1971) recorded that *Burramys* stores food in its nests. Only nuts and seeds are stored in these caches. Invertebrates are eaten when caught and if excess insects are provided they are never taken to the nests and stored. The nuts or seeds are held in front of the premolars, resting on the lower incisors. Animals may carry peanuts or sunflower seeds

for as long as 15 minutes, and indulge in other activities such as scratching themselves or exploring their cages, before taking the food to their nests.

Breeding

The eight females examined by us and Dixon's (1971) single example had four teats. When the female is in breeding condition the pouch is deep, moist, and pink. The entrance may be almost invisible when the animal does not have young. In the non-breeding state the pouch appears to be much smaller and relatively dry and there may be some dark scale especially on the teats which are very small. There is a prominent tuft of hair around the teats, which is yellowish in colour presumably due to pigment stain. A female caught on 22 October 1971 was introduced to a male that had been in captivity since 7 January 1971. For the first hour he followed her closely sniffing at her cloacal area but then ignored her.

Four females with young have been examined and judging from the size of the young when first seen, the litters of three of them were born in the second half of November. As we wished to raise the young we handled the animals as little as possible and never caught and examined them more frequently than once a week. A female caught on 1 December 1971 had a moist tumescent pouch with prominent teats. On the following day she had four young. Another female, trapped on 11 November 1970, had a clean moist pouch and prominent teats. On 12 December one young was seen in the pouch and another with its head in the pouch and body outside. Two days later one young was found freshly dead on the floor of the cage; the other was still alive in the pouch. On 18 December the second young was found

dead and dry and partly eaten. All teats of the female were elongated and presumably it had a litter of four. Dimensions of the freshly dead young were as follows: head and body 11.6 mm, tail 12.2, ear 3.3, hindfoot 6.5 weight 0.9g.

A further female was collected on 27 November 1970. It had rained during the night and the temperature was below freezing point. The animal was cold to the touch and barely moved when handled but she revived when warmed and was fed honey and water and fully recovered. In her pouch were four pink naked young with head-and-body lengths estimated to be 8-10 mm. Growth was rapid and in three weeks the head-and-body lengths were approximately 25 mm. On 19 December the mother was lying on her back in the nest and the bodies of three young were outside the pouch with their heads inside. They had short dark fur on the head and back while the ventral surface was naked and pink. The young were never seen in the pouch after 21 December. On 2 January one young was observed for the first time with its eyes open and the following day all young had their eyes open. At this time the head-and-body lengths were 50-60 mm, the dorsal surface was covered with dark grey fur and there was white fur on the ventral surface. The rufous markings had not developed but began to show about a week later when the ventral surface took on a greyish tinge. By mid-March the young weighed between 30 and 40g and were considered to be fully grown.

At the time the young first left the pouch the mother spent almost all of her time with them and ate very little for several days. After that her food consumption increased greatly—up to 28 mealworms, 6-8 peanuts, 36 sunflower seeds and some honey,

were taken daily. When she left the nest she spent a great deal of time cleaning and grooming her fur. On 8 January she abandoned the nest and lived under the rock pile. The following day the young left the nest box and went to live with her. The young were never seen clinging to the mother or riding on her back. At the time they left the nest box they began to eat mealworms and peanuts but continued to suckle for a few weeks. Two young were removed to a separate cage when the only female of the litter was found dead apparently from injuries.

When the pouch young are still attached they are carefully groomed by the mother. While squatting on her hindquarters she holds the pouch open with her forepaws, puts her muzzle into the pouch and licks the young.

Hibernation

Because of the severity of the habitat and the knowledge that hibernation is known in the nearest related genus, *Cercartetus* (Hickman and Hickman 1960, Bartholomew and Hudson 1962), it was thought possible that *Burramys* would hibernate. Three of the nineteen animals, two females and a male, were cold and torpid when taken from traps but all recovered quickly after warming. The three original animals were kept in the same room as three *Cercartetus nanus*, during the winter of 1970. The temperature of the room varied from 5 to 20°C. One *Burramys* died on 27 July. No *Burramys* showed any signs of torpor. All *Cercartetus* hibernated for various periods. For example, one animal caught as a juvenile in February remained active to 20 June and was torpid for the following four days. In July it was torpid for a total of 13 days, including one period of four days, and for single days only in August and September.

Three adult *Burrhamys* and the three grown young were kept through the winter of 1971 in a basement garage in which the temperature varied from 9-13°C. The mother of the three young was the only one that showed any inclination to hibernation. She was very fat and weighed over 70 g. She did not eat during the night of 28-29 April nor on the next four nights. During this time she remained in the nest box, was cold to the touch, and the respiration rate was much lower than normal. The respiration rate increased when she was handled, but she did not arouse except that she lifted her head slowly on one occasion when the nest was examined. Some food, less than the normal amount, was eaten during the night of 3-4 May. During the following week the animal and her nest box were placed in a small wire insect cage on a verandah where minimum temperatures were sometimes as low as -4°C. Her food intake and behaviour remained normal for a week and she was returned to her usual cage. During the night of 16-17 July she did not eat and was torpid in the nest box. She was put outside again in the small cage. This period of hibernation lasted three days, following which she remained active until the night of 28-29 July when she again became torpid. She remained so until the night of 4-5 August, a period of seven days, when she apparently, aroused, chewed a hole in the cage and unfortunately escaped.

This behaviour is indistinguishable from hibernation in *Cercartetus*, and providing the animal was physiologically normal it indicates that *Burrhamys* may hibernate under certain conditions at present unknown.

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